Procedure *INIT-PATH*

{*Invoked when the node comes up.*}

1. Initialize all tables.
2. Run *PATH* algorithm.

End *INIT-PATH*

Algorithm *PATH*

{*Invoked when a message M is received from neighbor k, or an adjacent link to k has changed or when a node is initialized.*}

1. Run *NTU* to update neighbor tables.
2. Run *MTU* to update main tables.
3. For each destination j marked as *changed*,
   Add update entry $[j, D_j^i, p_j^i]$ to the new message M'.
4. Within finite amount of time, send message M' to each neighbor.

End *PATH*

FIG. 1

Procedure *NTU*

{*Called by PATH to process an event.* }

1. If event is a message M from neighbor k,
   a. For each entry $[j, d, p]$ in M //Note $d = D_j^k$, $p = p_j^k$)
      Set $D_{jk}^i \leftarrow d$ and $p_{jk}^i \leftarrow p$
   b. For each destination j with an entry in M,
      Remove existing links (n, j) in T_k^i and add new link (m, j, d) to T_k^i, where $d = D_{jk}^i - D_{mk}^i$ and $m = p_{jk}^i$.
2. If the event is an adjacent link-status change, update l_k^i and clear neighbor tables of k, if link is down.

End *NTU*

FIG. 2

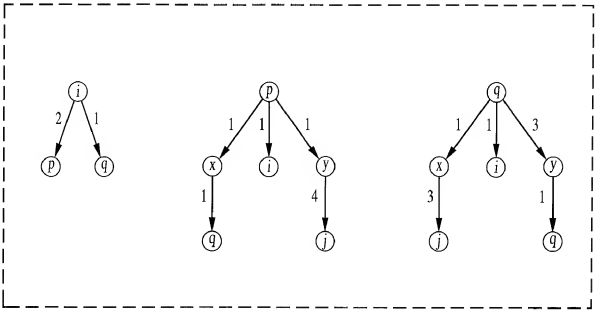
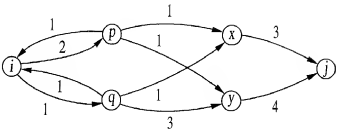


FIG. 3A



Preferred Neighbors

Destination	p	q	x	y	j
Distance	2	1	2	3	5
Pref. Nbr	p	q	q	p	q

FIG. 3B

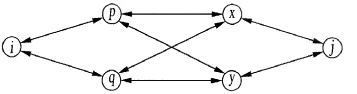


FIG. 4A

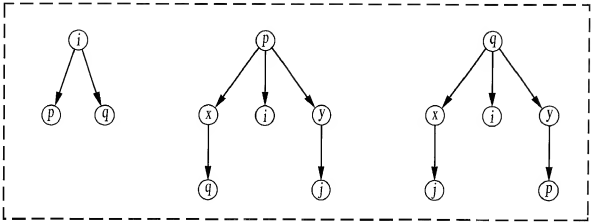


FIG. 4B

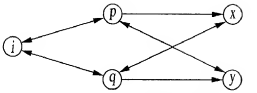


FIG. 4C

Procedure *MTU*

1. Clear link table T^i
2. For each node $j \neq i$ occuring in at least one T_k^i
   a. Find $MIN \leftarrow min\{D_{jk}^i + l_{ik}^i | k \in N^i\}$.
   b. Let n be such that $MIN = (D_{jn}^i + l_{in}^i)$. Ties are broken *consistently*. Neighbor n is the preferred neighbor for destination j. For each link (j, v, d) in T_n^i
      Add link (j, v, d) to T^i
3. Update T with each link l_k^i
4. Run Dijkstra's shortest path algorithm on T^i to find new D_j^i, and p_j^i
5. For each destination j, if D_j^i or p_j^i changed from previous value, set *changed* and *report-it* flags for j.

End *MTU*

FIG. 5

Procedure *INIT-MPATH*

{*Invoked when the node comes up.*}

1. Initialize tables and run MPATH.

End *INIT-MPATH*

Algorithm M P A T H

{*Invoked when a message M is received from neighbor k, or an adjacent link to k has changed.*}

1. Run *NTU* to update neighbor tables.
2. Run *MTU* to obtain new D_j^i and p_j^i.
3. If node is *PASSIVE* or node is *ACTIVE* ∧ last reply arrived,
   Reset *goactive* flag.
   For each destination *j* marked as *report-it*,
   a. $FD_j^i \leftarrow min\{D_j^i, RD_j^i\}$
   b. If $D_j^i > RD_j^i$ Set *goactive* flag.
   c. $RD_j^i \leftarrow D_j^i$
   d. Add $[j, RD_j^i, p_j^i]$ to message *M'*.
   e. Clear *report-it* flag for *j*.
   Otherwise, the node is ACTIVE and waiting for more replies,
   For each destination *j* marked as *changed*,
   f. $FD_j^i \leftarrow min\{D_j^i, FD_j^i\}$
4. For each destination *j* marked as *changed*,
   a. Clear *changed* flag for *j*
   b. $S_j^i \leftarrow \{k | D_{jk}^i < FD_j^i\}$
5. For each neighbor *k*,
   a. $M'' \leftarrow M'$
   b. If event is *query* from *k*, Set *reply* flag in *M''*.
   c. If *goactive* set, Set *query* flag in *M''*.
   d. If *M''* non-empty, send *M''* to *k*.
6. If *goactive* set, become *ACTIVE*, otherwise become *PASSIVE*.

END *MPATH*

FIG. 6